Engine Combustion Network

Liquid Penetration Length

Mie-scattered light images were acquired during the quasi-steady period of the spray development. Details of the measurement techniques can be found in (Siebers, SAE Paper 980809). A 532-nm, continuous-wave laser was used to flood illuminate the spray while an image of the Mie-scattered light was acquired with an intensified camera orthogonal to the spray. A 532 nm narrowband-pass filter was placed in front of the camera. The camera gain was adjusted so that the peak scattered light intensity was just at the saturation limit of the camera. The camera gate was opened for 3.0 ms during a 5 to 6 ms injection event to generate a time-averaged image (Fig. 8.3.1). Gates were started after the liquid penetration reached a quasi-steady value, similar to the the time-averaging of lift-off length.

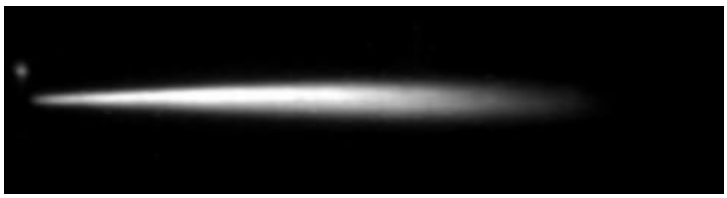

Figure 8.3.1

Analysis of the Mie-scattered light images for liquid length involved determining the maximum axial distance in the spray where the light intensity was above a threshold equal to 3% of the light intensity range measurable with the camera. This definition of liquid length was found to be relatively insensitive to large changes in parameters such as the laser power and the camera gain due to the rapid decline in the scattered light intensity at the leading edge of the liquid region. For example, a factor-of-two change in the laser power, the camera gain, or the threshold used to define liquid length changes the liquid length by, at most, 4% (Siebers SAE Paper 980809).

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Last Modified on January 5, 2007